HUMAN IMPACT SITE INVENTORY
1995 SUMMARY OF DATA REPORT

GAAR-95-002
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KELLY E. SHEA, U.S. National Park Service; P.O. Box 74680, Fairbanks, Alaska 99707.

INTRODUCTION

Section 201(4)(a) of ANILCA mandates that Gates of the Arctic National Park and Preserve be managed to maintain the "wild and undeveloped character" and the "natural environmental integrity and scenic beauty" of the area (ANILCA sec. 201(4)(a)). "The clear wilderness preservation mandate of Gates of the Arctic is reinforced by the designation of approximately 7,052,000 acres, the entire park unit, as wilderness. ANILCA section 701 directs that this wilderness be managed in accordance with the Wilderness Act of 1964 (78 Stat. 890) ... The Wilderness Act states that wilderness areas 'shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness.'" (NPS 1986, p.95). In order to achieve these directives, the park must "mitigate anthropogenic sources of vegetative impacts" (NPS 1994).

In 1986, a Human Impact Site Inventory (HISI) system was initiated to document and monitor human recreational impacts to natural resources in the park and preserve. Van Alstine reported on the status of this system in 1988 (Van Alstine 1988). Since 1988, no other evaluations have been made. It is the purpose of this report to summarize information obtained over time from this HISI system and recommend changes to the existing system.

STUDY AREA

Gates of the Arctic National Park and Preserve (GAAR) is situated within the central Brooks Range in the northern interior of Alaska, straddling the Continental Divide (Figure 1 and 2). The park encompasses both south and north slope of the Brooks Range with subarctic and low-arctic continental climates respectively. The subarctic climate zone is characterized by low precipitation (8-18 in. or 20-46 cm of rain per year), snow fall averaging 60-80 in. (150-200 cm) over 8 or 9 months of the year, average maximum temperatures between 65°F and 70°F (47°C and 52°C) and average minimum temperatures between -20°F and -30°F (-29°C and -34°C) (NPS 1986). The low-arctic climate zone is characterized by desert precipitation conditions of 5-10 in. (13-25 cm) of rain per year, snowfall averages between 35 and 50 in. (90 and 130 cm) per year, average maximum temperatures range between 55°F and 65°F (13°C and 18°C) and average minimum temperatures range between -5°F and -10°F (-21°C and -23°C) (NPS 1986).

Within the park and preserve, there are three main vegetation

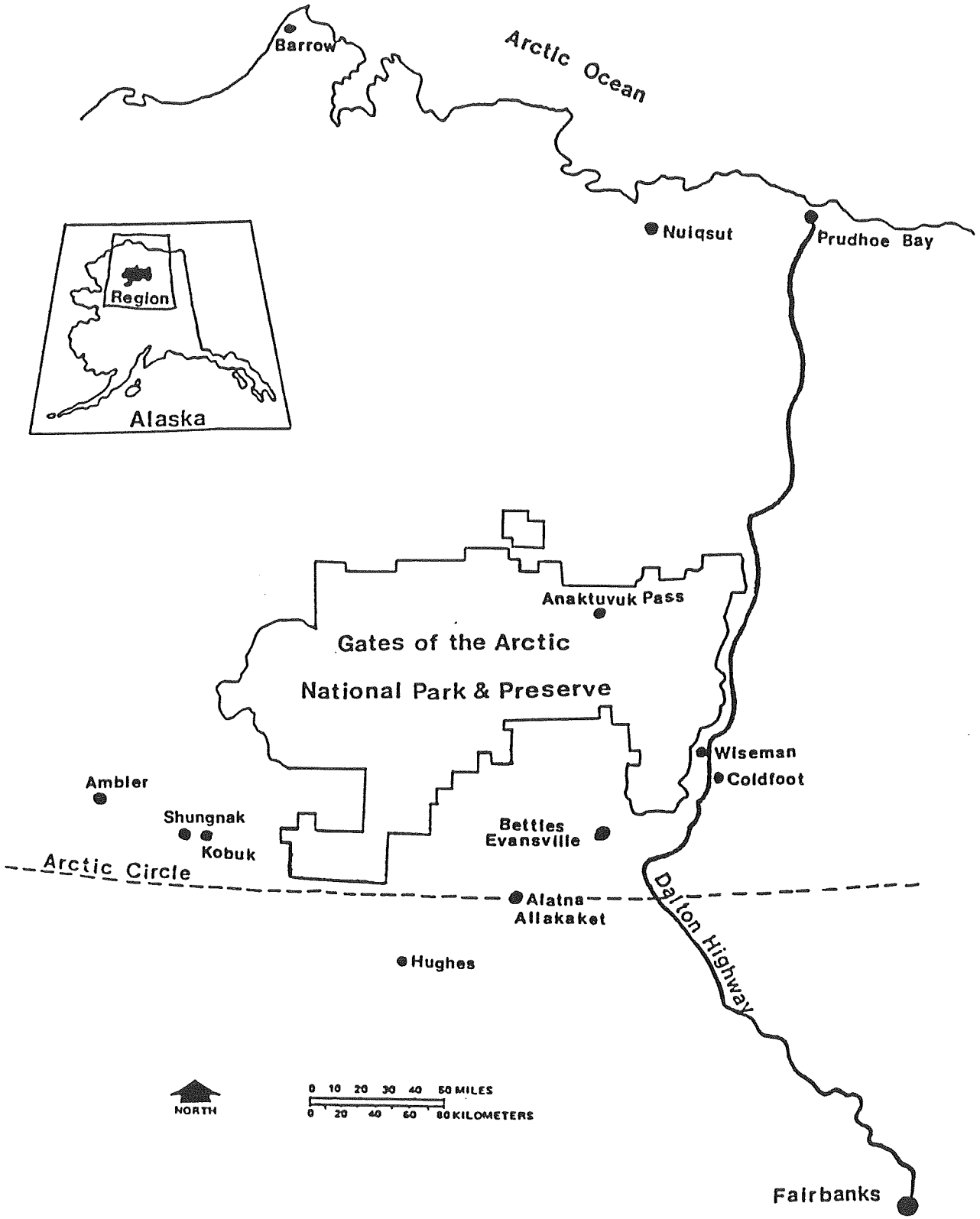
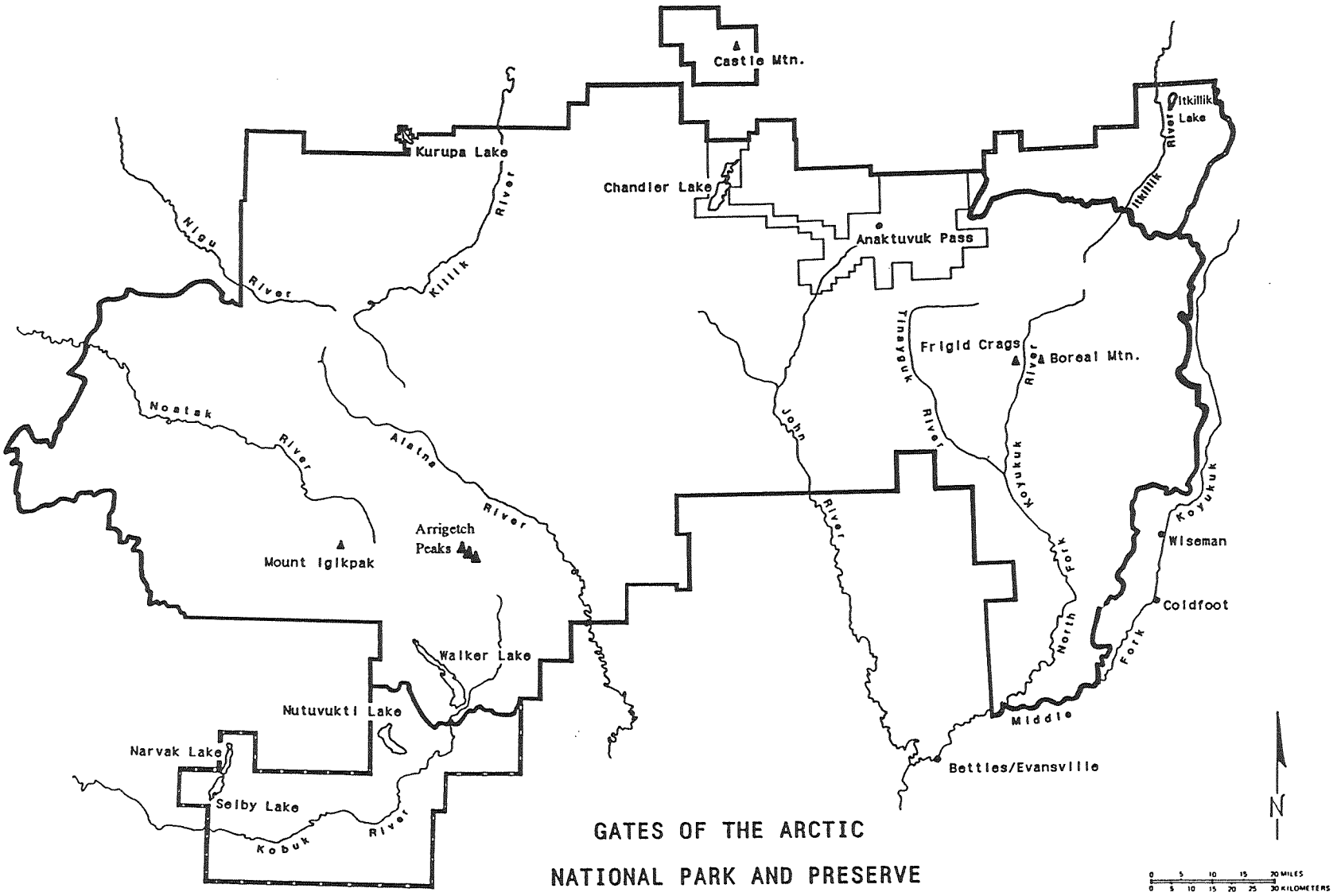


Figure 1: Location of Gates of the Arctic National Park and Preserve in northern Alaska



GATES OF THE ARCTIC

NATIONAL PARK AND PRESERVE

associations including: 1. taiga (boreal forest) with black spruce (Picea mariana) and white spruce (Picea glauca) dominant, 2. alpine tundra dominated by mountain-avens (Dryas sp.) or mat-forming heath (ericaceous) species and arctic tundra delineated by moisture type into dry, mesic and wet; dry arctic tundra is dominated by mountain-avens (Dryas sp.) or mat-forming heath (ericaceous sp.) similar to alpine tundra; mesic arctic tundra is dominated by tussocks, formed by cottongrass (Eriophorum sp.) and wet arctic tundra is dominated by grass (Carex aquatilis) and sedge (Eriophorum angustifolium); and 3. shrub thicket with alder (alnus sp.) and willow (Salix sp.) shrub dominant (NPS 1986).

Recreational camp sites, known as Human Impact Sites are found throughout the park and preserve in both climatic zones and all vegetation associations. HISs are often located around access point lakes and gravel strips, near exceptional scenic areas, along rivers corridors, on top of dry terraces and within open boreal forest. Areas with HISs include: Alatna River drainage, Arrigetch Creek, Dalton Hwy, John River, Killik River, Kobuk River drainage, Kurupa Lake, Itkillik River drainage, Noatak River, North Fork Koyukuk River and Walker Lake.

The Alatna River drainage flows south of the divide and traverses through the treeless headwaters into boreal forest filled with abundant wildlife and scenic beauty. Arrigetch Creek lies within the Alatna River drainage but is separated out for our purposes because of its high concentration of use. Arrigetch Creek is one entrance to the scenic, climbing attraction known as the Arrigetch Peaks. The Dalton Hwy is the utility corridor to the Alaskan oil pipeline and traverses within several miles of the eastern boundary of the park. Hiking access to the park can be found through numerous drainages off the Hwy. The John River headwaters originate near the village of Anaktuvuk Pass at the divide and flow south entering the Koyukuk 7 miles downstream from Bettles, the location of the park field headquarters.

The Killik River flows north through the park passing tundra and sand dunes on its way to the Colville River. The Kobuk River flows south of the divide past Walker Lake through the forested southern preserve. This river is abundant in fish and wildlife which are gathered by subsistence and sport hunters and fishermen. Kurupa Lake is a deep lake surrounded by mountains located north of the divide. Pre-park it was a popular sheep hunting area. The Itkillik River flows north of the divide through the northeast preserve which serves as a popular sport hunting spot and has hiking access from the Dalton Hwy.

The Noatak River is north of the divide flowing west through tundra and mountains into Kotzebue Sound. The scenic beauty, treeless landscapes, and accessibility makes this a very popular area. North Fork of the Koyukuk flows south of the divide past Boreal Mountain and Frigid Craigs titled by an early white explorer as the

Gates of the Arctic. The river flows through historical mining areas joining up with the Middle Fork before passing Bettles. Walker Lake, located in the southern part of the park, is known for its scenic beauty and record sport fishing. It is also used as a staging area for floats down the Kobuk River.

METHODS

In 1986 a data form and data base were developed for standardized documentation and monitoring of human recreational disturbance in the park (Appendix 1). The data base was designed using DBase III* software. The forms were used by park biologists and rangers when in the park to document and update recreational site impacts from 1986 through 1994.

Information obtained from the HISI forms included site location, site description, impact type, impact description, vegetation type, vegetation structure, vegetation damage, soil exposure, soil description and ground surface condition. The forms were designed for use by personnel with little or no technical experience in vegetation and soil classification. Forms were completed for new sites as well as repeat visits to previously documented sites.

At the end of each season HISI forms were collected and site data was entered into the HISI data base (Appendix 2). Specific vegetation and soil information from the first visit to a site was entered in the VGSOSUM1 data base. General information collected during subsequent visits was entered as an update in the HISI data base. Specific vegetation and soil information from subsequent visits was entered separately in VGSOSUM2 data base.

A summary of all existing data was made using DBase III* software. Filters were used to extract specific data and counts from data base file. The data was then printed in report format. Comparable data, from different visits to the same human impact site, was related once in report form. The structure of the data base file allowed only manual comparison of year to year analogous data.

Changes over time in vegetation damage, soil erosion and ground surface condition were summarized using incremental scales of damage and recovery. Scales were set by grouping damage and exposure classes into low, moderate and high categories (See Table 1). A change that stayed within the same category was a slight change; a change from low to moderate, moderate to high, or vice versa was a moderate change; while a change from low to high or high to low was considered a large change. Each site was labeled accordingly and tallied.

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* **Disclaimer** - The mention of trade names or commercial products in this report does not constitute endorsement or recommendation for use by the federal government.

TABLE 1. IMPACT CHANGE OVER TIME MEASUREMENT SCALES			
TYPE OF IMPACT	IMPACT LEVEL		
	LOW	MODERATE	HIGH/SEVERE
VEGETATION DAMAGE	1. Undamaged 2. Standing Veg Compression, No Surface Disturbance 3. Shrubs Broken 4. Tree Damaged	5. Veg Removed (5-25%) 6. Veg Removed (25-50%)	7. Veg Removed (50-75%) 8. Veg Removed (75-100%)
SOIL EXPOSURE	1. None Exposed 2. 1-5% Exposed 3. 10% Exposed	4. 25% Exposed 5. 50% Exposed 6. 75% Exposed	7. 90% Exposed 8. 100% Exposed
GROUND SURFACE	1. Undamaged 2. Ground Scuffing	3. Trails Starting to Form 4. Trails Continuous	5. Trail with Stndng Water 6. Broad Areas of exposed & Comp. Soil

RESULTS

Nine years of HISI data collection by GAAR personnel have documented 122 HISs. These sites can be divided into 11 distinct areas including: Alatna River drainage (10 HISs), Arrigetch Creek (17 HISs), Dalton Highway (3 HISs), John River (4 HISs), Killik River (4 HISs), Kobuk River drainage (9 HISs), Kurupa Lake (1 HIS), Itkillik River drainage (3 HISs), Noatak River (18 HISs), North Fork Koyukuk River (24 HISs) and Walker Lake (28 HISs) (Appendix 3). Primary vegetation structure for the documented sites can be seen in Table 2 below.

TABLE 2. HUMAN IMPACT SITE LISTING BY DOMINANT VEGETATION TYPE		
VEGETATION TYPE	NO OF SITES PER COMMUNITY TYPE, FIRST VISITS	NO OF SITES PER COMMUNITY TYPE FOR SUBSEQUENT VISITS
FOREST	80 SITES	53 SITES
SCRUB (> 2FT)	25 SITES	18 SITES
SCRUB (< OR = 2FT)	6 SITES	2 SITES
HERBACEOUS	3 SITES	2 SITES
NOT AVAILABLE	7 SITES	1 SITE

Impact Types

The "impact type" field in the HISI data base is broken down into 10 categories. Of these 10, 5 impacts were more commonly found at HISI sites.

HISs having fire rings (pits) accounted for 75% of sites studied (n=122) (See Table 2). Of these sites, 48% (n=92) had wood piles. Overall, wood piles were found on 38% (n=122) (See Table 2) of sites of which two sites had wood piles with no fire rings. Tundra sites with fire rings represent 26% of the total HISs (n=122). One tundra HIS had wood piles but no fire ring (n=122).

HISs having vegetation damage accounted for 89% of sites studied (n=122) (See Table 2). Overall, 74% of sites have trails (n=122) (See Table 2). HISs with soil erosion represent 41% (n=122) of sites documented (See Table 2). Of these sites, 60% have slight erosion, 38% have moderate erosion and 2% have severe erosion (n=50) (See Table 3).

Twelve HISs have cabins, one of which has burned down since initially inventoried (See Table 2). HIS 145, Peggy Harry Cabin, and HIS 148, White Bluffs Cabin, both washed away in the flood of 1994. A half barrel stove still remains at the White Bluffs Cabin site.

TABLE 3. NUMBER OF HUMAN IMPACT SITES WITH GIVEN IMPACT TYPE		
Fire Rings (Pits)		91
Wood Piles		46
Vegetation Damage		109
Hiking/Portage Trails		90
Soil Erosion	Slight	30
	Moderate	19
	Severe	1
Cabins		12

Vegetation Damage

Overall, 31% of the documented HISs had greater than 25% of the vegetation removed at the site on the initial visit (See Table 4). Twenty-nine percent of HISs had greater than 50% vegetation removed at the time of the first visit (n=122) (See Table 4)

Soil Exposure

At the time of the first visit, 34% of the total documented HISs had a soil exposure level greater than 25% (n=122) (See Table 4). Twenty-two percent of HISs had a soil exposure level greater than 50% (n=122) at the time of the first visit (See Table 4).

Ground Surface Condition

Following the initial visit, 23% of HISs were rated as having an undamaged ground condition, 66% of HISs had ground scuffing, 52% had trails starting to form, 46% of HISs had continuous trails, 2% had trails with standing water, and 38% had broad areas of exposed and compacted soil (n=122) (See Table 4). Overall, 30% of HISs were rated as having both continuous trails and broad areas of exposed and compacted soil (See Table 4). Sites were given more than one rating which accounts for the sum of conditions exceeding 100%.

Site Revisitation

Of the 122 HISs documented 76 have been revisited at least once. Changes in vegetation damage over time were analyzed for the 76 revisited sites. Of these, 47% have had no change in vegetation damage since the initial visit, 17% had a slight increase in vegetation damage, 16% had a moderate increase in vegetation damage, 7% showed a slight recovery in vegetation damage and 13% had a moderate recovery in vegetation damage (n=76).

Changes in soil exposure levels over time were analyzed for the 76 HISs revisited. It was discovered that 68% of the sites examined have had no change in soil exposure, 9% had a slight increase in soil exposure, 11% had a moderate increase in soil exposure, 9% had a slight recovery in soil exposure and 3% had a moderate recovery in soil exposure (n=76).

Changes in ground surface condition over time were also examined for the 76 HISs revisited. It was discovered that 75% of these sites had no change in ground surface condition, 1.3% had a slight increase in damage to ground surface condition, 14% had a moderate increase in damage to ground surface condition, 1.3% had a large increase in damage to ground surface condition, 1.3% had a slight recovery in the ground surface condition, 5% had a moderate recovery in the ground surface condition and 1.3% had a large recovery in the ground surface condition (n=76).

Site Improvements

In the past, fire signs have been destroyed at 7% of the overall HISs (n=122) during the initial visit. Park personnel have cleaned up garbage and in some instances human waste at 46% of the sites (n=122). Stuctural improvements have been dismantled at 7% of the

HISs.

TABLE 4. NUMBER OF HUMAN IMPACT SITES WITH A GIVEN VEGETATION DAMAGE, SOIL EXPOSURE OR GROUND SURFACE CONDITION LEVEL, AT THE TIME OF THE FIRST VISIT

CONDITION	LEVEL	NO OF HUMAN IMPACT SITES
VEGETATION DAMAGE	UNDAMAGED	22
	COMPRESSED W/NO SURF. DISTURB.	68
	SHRUBS BROKEN	32
	TREES DAMAGED	55
	VEG REMVD (5-25%)	50
	VEG REMVD (25-50%)	19
	VEG REMVD (50-75%)	18
	VEG REMVD (75-100%)	7
SOIL EXPOSURE	NONE EXPOSED	20
	1%-5% EXPOSED	46
	10% EXPOSED	22
	25% EXPOSED	14
	50% EXPOSED	12
	75% EXPOSED	13
	90% EXPOSED	3
	100% EXPOSED	1
GROUND SURFACE CONDITION	UNDAMAGED	28
	GROUND SCUFFING	80
	TRAILS STARTING TO FORM	64
	TRAILS CONTINUOUS	56
	TRAILS W/STANDING WATER	3
	BROAD AREAS OF EXPOSED & COMPACTED SOIL	46
	TRAILS CONT. & BROAD AREAS OF EXP. & COMP. SOIL	37

CONCLUSIONS

Fire Rings

A high percentage of HISs have fire rings. Twenty-six percent of sites with fire rings were found in tundra, an ecosystem very sensitive to disturbance. There is not enough firewood in tundra areas to sustain the use of recreational camp fires. Damage to tundra shrub communities occurs with continual recreational fire use as firewood size shrubs are used for firewood. Organic soil

layers are burned and removed by fires exposing organic soil. The Arrigetch Creek valley is especially susceptible to impact because of its alpine tundra vegetation community and concentrated area of use.

Vegetation Damage

Sites with damage to vegetation are frequently found in the park. More than 1/4 of the inventoried HISs have more than 50% of the associated vegetation removed. Subarctic and low-arctic lands are impacted with minimal use. Impacts would be reduced if recreational users would keep camps small, stay only short periods of time in one site and try to camp on gravel bars whenever possible.

Soil Erosion and Exposure

Factors determining the extent of erosion on recreational sites include slope, drainage, soil type and climate (Hammitt and Cole 1987). "Erosion is likely to be more serious on steep slopes where water tends to be channelized and in climates with infrequent but intense rainfall" (Hammitt and Cole 1987, p.49). Removal of groundcover vegetation and organic soil horizons increase the possibility of erosion (Hammitt and Cole 1987). Soil types that tend to be erosive are "those high in silt or fine sand and low in organic matter" (Hammitt and Cole 1987, p.49). Generally, most campsites are less susceptible to erosion because campsites are usually developed on flat areas and compaction can sometimes off-set the erosion potential that results from removal of vegetation and litter cover (Cole 1987). However, recreational campsites that are poorly located on steep slope area and have erosive soil are likely to have erosion (Cole 1987). Erosion of soil at HISs is visible but does not look serious at this time.

Surface Ground Conditions

Approximately 3/4 of the inventoried HISs have hiking trails. Trail formation facilitates the spreading of tent pad sites and other types of HISs. Close to 1/3 of the HISs have both continuous hiking trails and camp sites with broad areas of exposed and compacted soil. This is a significant number of impacted sites which need to be monitored closely for further compounding of impacts.

Current access patterns in the park, bring about the concentration of surface ground impacts. Access to the park is restricted to commercial planes into Anaktuvuk Pass, hiking in from the Dalton Highway or charter plane into accessible lakes, rivers and gravel strips. Human impact is concentrated around these points of access. Restrictions on prolonged single campsite use may help to alleviate concentrated heavy impact.

Site Revisits

The majority of revisited HISs have not had any significant changes from year to year in vegetation damage, soil exposure or ground surface condition. The remaining HISs show a higher number of sites with an increase in impact than recovery. The change in ground surface condition reflects a 14% moderate increase in damage and only a 5% moderate recovery. The trend here, over the past 9 years is one of increase in impact. Park personnel have helped to clean up close to 1/2 of the HISs.

Management Recommendations

Recreational use of fires on tundra needs to be monitored closely. Restrictions on fire use in tundra should be made and enforced if recreational tundra fires increase. Restrictions on fire should be made in the Arrigetch at this time to prevent gross damage to vegetation in this area.

Sites should continue to be monitored to show any increase in erosion. Severely eroding sites should be mitigated through temporary use closings, especially during June and July to facilitate natural plant growth. Aeration of soil and/or native vegetation seedings may be necessary if natural revegetation of bare eroding areas does not occur.

Management action choices for mitigation of ground surface conditions include concentration of use to a few sites that will incur heavy impact or spreading use throughout a larger area bringing about numerous sites with less impact. Areas with high use recreational camping should be confined to the established campsites to avoid further campsite proliferation (Cole 1987). In areas of the park with low use, recreational camping should be spread out to alleviate establishment of heavily impacted sites (Cole 1987). At this time, there are two areas, Arrigetch Creek and Walker Lake, with high use leading to heavily impacted sites. Recreational camping in these locations should be restricted to established campsites. Use dispersal throughout the park should be used to relieve pressure from these high use areas.

Currently, improvements need to be dismantled at 3% of the HISs (n=122). Sites needing major clean-up make up 5% of documented HISs (n=122). Sites needing minor clean-up make up 25% of HISs (n=122). Fire sign destruction is needed at 7% of HISs (n=122).

Thirty percent of the documented HISs need clean up of some sort. Clean-up would involve garbage collection, human waste burying and toilet paper burning. Recreational use is expected to increase which will create a continual need for a clean-up program.

The HIS form used over the past 9 years is too complex for use by lay people. The information received from this form is subjective

and varies greatly depending on the number of persons using the form and their knowledge and background. The data base file formats that were created early on in the monitoring development are cumbersome to work with. The data base does not facilitate easy data summaries or statistical analysis. Data has been entered into the data base by many different people, each with their own style and understanding of what should be entered. This has lead to excessive time spent editing the files.

It is important that HISs continue to be monitored for changes and new areas of impact. This should be approached using a two pronged approach. Park personnel on patrol should have a basic form to record new HISs and gross changes in previously documented sites. A sample HISI form can be found in Appendix 4. GAAR, Resource Management Division should monitor HISs using scientifically valid measuring techniques to obtain quantitative data. This data could than be statistically analyzed to determine more accurate changes over time.

Time should be spent developing a data base format where information can be extracted easily for interpretation. Data entering instructions should be explicitly conveyed both in oral and written form. One GAAR Resource Management biologist should oversee the project to maintain continuity. This biologist should evaluate the project each year to recommend and implement changes in collection method and format.

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APPENDIX 1

Visit #: _____ HUMAN IMPACT SITE INVENTORY - GAAR Site #: _____

General Location: _____ Date: _____

Site Name: _____

Quad: _____ Twnshp: _____ Range: _____ Section, 1/4 sec.: _____

Latitude: _____ Longitude: _____

Observer(s): _____

Tagged reference point: _____

I. Types of impact: _____

Vegetation and Soil Disturbance Summary

II.Community Type/Cover	III.Veg. Structure/ Cover	IV.Veg. Damage	V. Soil Exposure	VI.Soil Type	VII.Soil Moisture	VIII.Groun Surface Condition

Comments on veg/soil disturbances: _____

Details on other impacts (litter, sanitation, etc.)

IX. Management Action Taken: _____

X. Management Action Needed: _____

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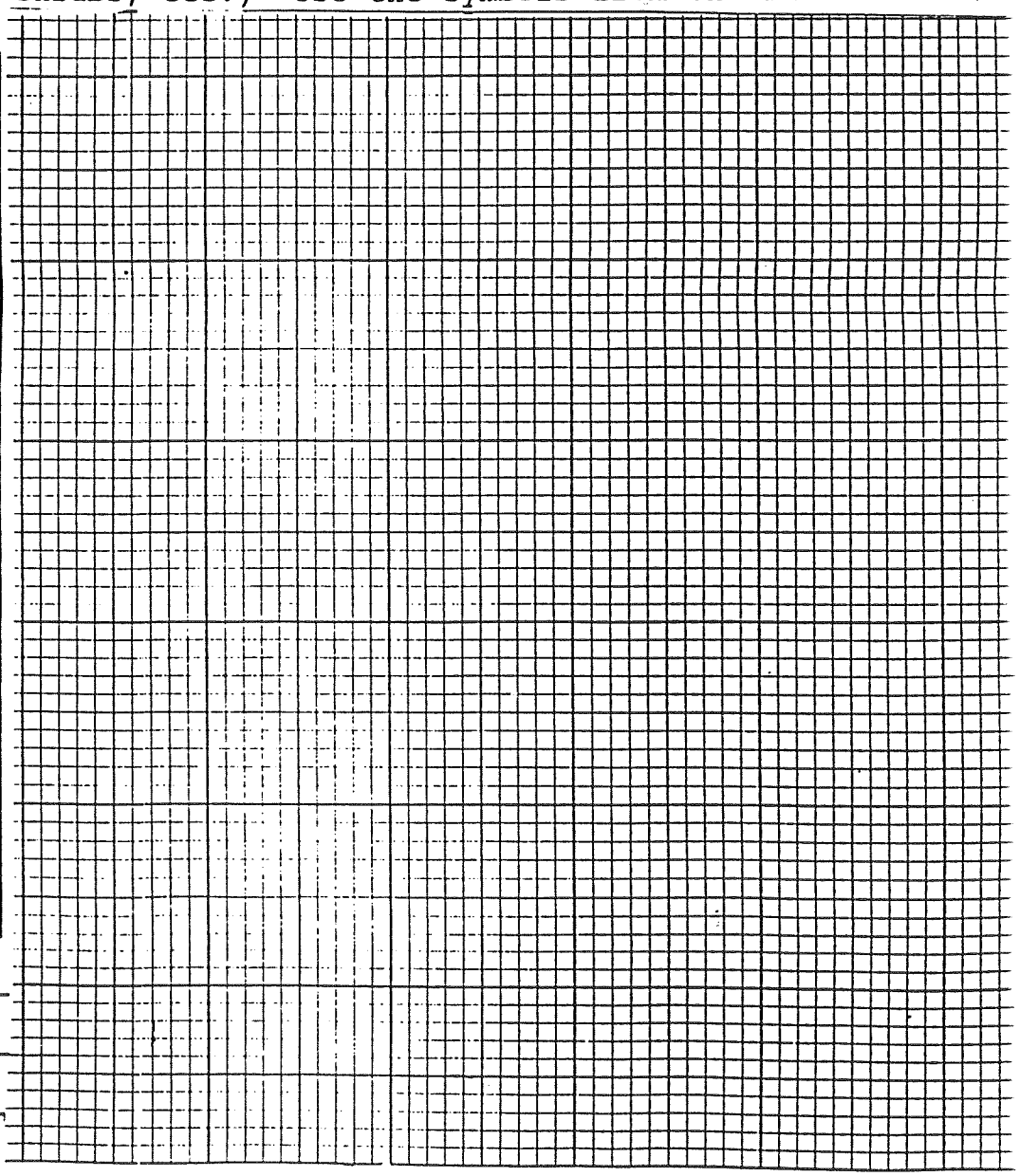
HISI SITE SKETCHES

Site Location Sketch (indicate geographical features)

Detailed Sketch (show site dimensions, photo locations, direction of n location of vegetation communities, devegetated area, trampled area, tr damaged trees, tagged reference point, fire rings and pits, tree stumps, major live trees and shrubs, etc.) Use the symbols from the Disturbance K

Photo Location Key	
Location Symbol	Frame #



Camera used: _____

Film: _____

Lens type: _____

APPENDIX 1 (Continued)

HUMAN IMPACT SITE DISTURBANCE KEY D:\IMPACTS\HISIKEY

I. Impact Type
1. Fires
2. Litter
3. Sanitation(other than litter)
4. Vegetation damage
5. Trails
6. Erosion
   a. slight
   b. moderate
   c. severe
7. Cabin(s)
8. Gov't. agency refuse
9. Other impacts (specify)
10. Firewood piles

II. Community Type
1. Forest (>10% tree cover; trees > 10 ft.)
   a. Needleleaf (conifer) >75% of tree species
   b. Broadleaf (>75% of tree species)
   c. Mixed (25%>needleleaf or broadleaf <75% of tree cover
2. Scrub (<10% tree cover and >25% shrub cover)
   a. Dwarf tree (mature trees,10ft,>10% cover)
   b. Tall shrub(>25% cover of shrubs taller than 5ft)
   c. Low shrub (>25% cover of shrubs 0.7ft-5ft, tall shrubs <25% cover)
   d. Dwarf shrub (>25% cover of shrubs, <0.7ft tall, low shrubs <25% shrub cover)
3. Herbaceous (may have <25% shrub cover)
   a. Graminoid (grasses or sedges dominant)
   b. Forb (broadleaf herbs dominant)
   c. Bryoid (moss/lichen dominant)
   d. Aquatic
4. Non-vegetated areas (natural)
   a. Sand, silt, or gravel
   b. Rock

III. Vegetation Structure
A. Trees over 15 ft high
B. Trees up to 15ft high
C. Non-woody, grass-like 2ft to 5ft high
D. Woody, tall shrubs or dwarf trees 2 -15ft
E. Woody shrubs up to 2ft
F. Sedges and grasses up to 2ft high
G. Non-woody broadleaf plants up to 2ft high
H. Mats of lichen
I. Mats of moss

IV. Vegetation Damage
1. Undamaged
2. Standing vegetation compressed, no surface disturbance
3. Shrubs broken
4. Trees damaged (also give # damaged)
5. Vegetation removed (5-25%)
6. Vegetation removed (25-50%)
7. Vegetation removed (50-75%)
8. Vegetation removed (75-100%)

V. Soil Exposure
1. None exposed
2. 1%-5% exposed
3. 10% exposed
4. 25% exposed
5. 50% exposed
6. 75% exposed
7. 90% exposed
8. 100% exposed

VI. Soil Type
1. Peat
2. Organic
3. Mineral/Rocky

VII. Soil Moisture
1. Dry
2. Moist
3. Wet (standing water evident)

VIII. Ground Surface
1. Undamaged
2. Ground scuffing
3. Trails starting to form
4. Trails continuous
5. Trails w/ standing water
6. Broad areas of exposed and compacted soil

Cover Classes
1. 0%-5%
2. 5%-25%
3. 25%-50%
4. 50%-75%
5. 75%-95%
6. 96%-100%

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Management Action Taken

1. No action
2. Destroyed fire signs
3. Cleaned up
4. Dismantled "improvements"
5. Other - (Specify)

X. Future Management Action Needed

1. No action
2. Destroy fire signs
3. Clean up - minor
4. Clean up - major
5. Dismantle "improvements"
6. Other - (Specify)

Key to Site Map Symbols


Fire ring (rocks)


Fire pit or scar (no rocks; only depression and/or charcoal present)


Trail


Tagged reference point

Devegetated area (< 50% vegetation cover)


Trampled vegetation


Tree stump - If large number of stumps are present, just show general area, and give total # of stumps.


Live tree (major)


Major shrub

Direction and location of photo

Direction of north

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Instructions for filling out Human Impact Site Inventory (HISI) Form - GAAR

Purpose: This form is the first step in the process of monitoring human-impacted sites within Gates of the Arctic National Park and Preserve. It is intended to be used by park rangers when they encounter sites used for camping or other human activities within GAAR. It has been designed so that a maximum amount of detailed information can be collected on the status of a site by park personnel with little or no botanical or soils expertise.

Visit #: 1 = the first visit for which a HISI has been filled out; 2, 3, etc. = revisits to the site.

Site #: This is the number on the metal tag left at the site. If you were unable to find something to tag, i.e. in a tundra area with no major shrubs, a letter will be assigned back in the office.

General Location: The general area of the Park - So far these have been divided into Alatna, Arrigetch, Haul Rd, John River, Kobuk River, N Fork of Koyukuk, N Slope of Brooks Range, NE Preserve, and Walker Lake.

Site name: Refer to a prominent geographical feature (more specific location than the General Location).

Quad: 1: 250,000 quad name and 1: 63,360 map (if it exists)

Twnshp: Township

Observers: First initial and last name of the person (or persons) documenting the site.

Tagged reference point: If possible, mark an easily relocated reference point (i.e., tree) with a metal tag and copper wire. Place the wire around a small (healthy not dead) branch, not around the whole trunk. (Note: If you find a site where the wire has been placed around a major trunk of the tree, please relocate the tag to a small branch.) Describe the location of the point and identify on the detailed site sketch. Remember: Someone else will have to relocate this tag in the future so make it easy for them to find the tag using your description. At the same time, try to place the tag so that it is not offensively obvious.

I. Type(s) of Impact(s): Refer to the list of impacts on the Disturbance Key page. Write the number of each impact that is present at the site. Indicate any additional impacts that do not fall within the categories listed here.

Revised 6/89

Vegetation and Soil Disturbance Summary Table: Refer to the Disturbance Key page.

II. Community Type/Cover: Determine the vegetation community type or types which have been impacted. These plant community types have been taken from the 1982 Revision of Preliminary Classification for Vegetation of Alaska by L.A. Viereck, C.T. Dyrness, and A.R. Batten. Also, give an estimate of the percentage cover of the impacted site by each community type, using the cover classes defined in the key. The data in this column of the table should appear, for example, as 1a/3, indicating a needleleaf forest covering 25%-50% of the site. Each column of this table should be filled out for each community type present.

III. Vegetation Structure/Cover: Information on the vegetation structure gives a more detailed picture of the types of plants present within a vegetation community. (This structure is for the vegetation in its undisturbed state.) Don't confuse structure with community type: most plant communities will consist of several layers of vegetation. All of the types of vegetation structure present in a community type should be written on the same line, i.e., the column may appear as follows: B/2, E/4, H/4, I/3. This would indicate 5%-25% cover by trees up to 15 feet, 50%-75% cover by woody shrubs up to 2 feet, 50%-75% cover by lichen mats, and 25%-50% cover by moss mats. Note: The sum of all of these cover classes will be >100% because of overlapping layers of vegetation.

IV. Vegetation Damage: In this column write the number of all of the kinds of vegetation damage present in the community type. If the vegetation damage is either: (2) Standing vegetation compressed, no surface disturbance or (3) Shrubs broken, make note of how much of the vegetation layer is so affected, i.e., if 5% of the shrubs are damaged, write 3(5%). If trees are damaged give the number of trees damaged and then explain the nature of that damage under Comments, i.e., branches broken off, tree roots exposed, etc.

V. Soil Exposure: Estimate the amount of soil exposed within the community type and write the number of the appropriate exposure.

VI. Soil Type: Type of soil exposed. (Peat is less decomposed than organic soil; partially decomposed plant parts are evident in peat).

VII. Soil Moisture: Write the number of the appropriate soil moisture and under Comments note current weather conditions that may affect soil moisture conditions.

VIII. Ground Surface Conditions: Write the number(s) of the condition(s) present.

IX. Management Action Taken: Indicate what actions you took at this site by writing the number of the appropriate action. Then give details (use back of page if necessary) such as how much trash was picked up.

X. Future Management Action Needed: Indicate what is needed to be done at

his site by writing the number of the appropriate action. Give details (use back of page if necessary) such as how much trash needs to be picked up (i.e how many plastic garbage bags full). Make a note about whether a helicopter could have access to this site to haul out trash.

Comments on veg/soil disturbances: Comment on anything in the vegetation and soil disturbance table that you feel needs clarification. Include any comments on erosion present or potential for erosion problems.

Details on other impacts: Give details on the other types of impacts not covered in the vegetation and soil disturbance table, i.e., descriptions of the amount of litter present, type of litter, fire signs(fire ring, charcoal, etc.). Also, comment on the extent of campsite development.

Site Sketches

Site location sketch: Draw the location of the impacted site (either aerial or eye level view) in relation to prominent geographical features. This sketch will be important in relocating sites, particularly in areas with no 1: 63,360 maps.

Detailed sketch: This is a crucial part of the site inventory so be accurate and neat. Use the map symbols for fire rings, devegetated soil, etc. contained in the Key. The map should be drawn to scale taking care especially to take dimensions of any devegetated areas. Devegetated is defined as an area having less than 50% vegetation cover. Use the measuring tape you will be taking out with you. Record physical features that mark the site boundaries, true North (check to see if your compass is corrected for declination), boundaries of vegetation communities, location of trails, fire rings, sites of erosion problems, etc. Indicate the location where photos were taken (using symbols indentified in the photo location key) and the direction that the photos were taken.

Note: Do the map in dark ink or pencil and darken any pencil-drawn maps so that xerox copies will be clear. Please, no blue ink, since it does not xerox. Don't convey any information through colored pens since this information will be lost on the xerox copy.

Photo documentation: Prior to 1989, photos were in the form of slides. Prints will be taken from now on. To make later identification of the site photos easier, you might take a photo of a sheet of paper giving the site name, date, and observers before taking photos of the site. Take photos that will give a good representation of the site condition, i.e. devegetated areas, damaged trees, trash. If you are able to take an aerial photo of the site, do so. Remember to record the location of each photo on the detailed site sketch using the symbols identified in the photo location key. (Use a capital letter to mark the location from which the photo is taken and an arrow pointing in the direction of the photo.) Then record the frame number. You may have the same location symbol for several different frames if you photograph in different directions from the same

spot. Record the camera used, i.e. Olympus XA, and the film, i.e. Kodak Kodacolor Gold 100.

****

To be done back in the office:

1.) Before turning in the finished site report, attach a xeroxed section of a quad map (1: 63,360 or 1: 250,000, if that is all that exists) with the site marked.

2.) Label the photos with site #, photo symbol from the Photo Location Key, frame number, any explanation of the photo that would be helpful, date, and photographer. Place the photos in the archival photo pages and attach these to the original form.

3.) Make a copy of the entire form. This copy will be the Bettles copy.

Equipment needed:

- Human Impact Site Inventory forms (including disturbance key and instructions)
- Tape measure
- Camera/film (print)
- Compass
- Metal tags
- Copper wire (for attaching tags)
- Pencil/Pen

APPENDIX 2

EXPLANATION OF THE GAAR HUMAN IMPACT SITE DBASE FILES

June 1989 with update from 1/17/95
D:\IMPACTS\HISIEX

The Human Impact Site Inventory (HISI) information is currently stored within three dBase files: HISI.dbf (with its associated memo file HISI.dbt), VGSOSUM1.dbf, and VGSOSUM2.dbf. The VGSOSUM1.dbf file contains the coded information in the vegetation and soil disturbance summary table from the first visit, VGSOSUM2.dbf contains information from the second site visit, indicating the changes from the first visit.
What follows is information needed to use, add to, etc. these files. A basic knowledge of dBase III Plus is assumed.

Key to the fields in the dBase file HISI.dbf: (Unless specified, all fields are character fields.)

1. GEN_LOC - the major drainage, lake or section of the park. When the park is systematically divided into zones for a visitor registration system, a ZONE field could replace this field. The current areas are: Noatak, N Fork of Koyukuk, John River, Kobuk River, NE Preserve, Walker Lake, Arrigetch, Alatna, Haul Rd, N Slope of Brooks Range.

2. LOCATION - the specific location of the site. This = the site name on the HISI form.

3. SITE_NO - the site number. If the site is tagged, the tag number is the site number. Generally, if a site is not tagged, a letter rather than a number = the site number. Note: this is the field common to the three files so that it is the link that allows data from different files to be used at the same time. (See information on "view files" below).

4. QUAD - the USGS 1:63 360 quad map on which the site is located or the 1:250 000 quad if that is all that exists for an area.

5. TWP - Township

6. RNGE - Range

7. LAT - Latitude

8. LONG - Longitude

9. HISI - a logical field (True or false) indicating whether

the Human Impact Site Inventory form has been filled out for a site. This is true for most of the sites entered, but a few sites have been entered which have just been noted before in field notes.

10. TAGGED - a logical field (True or False) indicating whether the site is tagged.

11. VISIT_1 - a date field for the visit when a HISI was completed.

12. LAST_VISIT- the year of the last visit.

13. IMPACTS - a list of the coded impact types present in the first visit. See Disturbance Key for code.

14. MN_ACT_TK1 - the management action taken on the first visit, encoded. See Disturbance Key for code.

15. MN_ACT_ND1 - the management action needed, encoded. See Disturbance Key for code.

16. PHOTOS - the number of photos taken on the first visit.

17. MEMO - a memo field which includes the location of the tag, and information about the first visit including observers for the first visit, notes about the site, description of the vegetation and soil disturbances and details on other impacts. It was decided to put all the text information for each visit in one memo field rather than splitting it up by subject. At least when this system was being developed, there were problems using the memo fields, with the memo data at one point getting placed in the wrong records, necessitating completely re-entering them. I was concerned that with many different memo fields there was the possibility of even more problems. Note that the information is actually stored in a memo file, identified by the .dbt extension. When copying the HISI file do so while within dBase rather than in DOS. When copying within dBase the .dbf and .dbt files are copied at the same time whereas in DOS you would have to copy the 2 files separately, which may have resulted in some of the earlier problems with the memo fields getting put in the wrong records.

18. VISIT_2 - a date field for the second visit.

19. IMP_CHG1_2- differences between visit 1 and 2, 2 and 3, 3 and 4, etc. in the coded impact types. Generally, something like "Add 4" or "Delete 1". Comparisons

should be ordered with earlier visit comparisons first. The year of the most recent visit should be noted (i.e. '93 del 2,3; '94 add 3). To know all the impact types at a site at a given visit, you would have to pull up the original list in the field "IMPACTS" + this field. This may be awkward, but the changes are emphasized.

20. CHANGES1_2 - a memo field detailing changes in vegetation and soil disturbances and in any other impacts from second and subsequent visits. Also includes the observers for the second and subsequent visits. Memos should be separated and labeled according to the year of visit.

21. MN_ACT_TK2 - the management action taken on the second and subsequent visits. Denote with year (i.e. '93 1,2; '94 2,4). Encoded. See Disturbance Key for code.

22. MN_ACT_ND2 - the management action needed after second and subsequent visits. Denote with year (i.e. '93 1,3; '94 2). Encoded. See Disturbance Key for code.

23. PHOTOS2 - number of photos taken at the second visit.

Key to the Dbase file VGSOSUM1

1. SITE_NO - same as the site number in the file HISI.
2. CM_TYPE_CV1 - the encoded first vegetation community type and cover class.

Fields 3 - 8 contain information pertaining to this first community type.

3. VEG_STRCV1 - the encoded vegetation structure and cover classes.

4. VEG_DAMGE1 - the encoded vegetation damage.

5. SOIL_EX1 - the encoded % of soil exposure.

6. SOIL_TY1 - the encoded soil type.

7. SOIL_MOIS1 - the encoded soil moisture.

8. GR_SR_C1 - the encoded ground surface condition.

This same information, but for each additional vegetation community is included in fields similar to the above, but ending with either a 2 or 3. Small differences include SOIL_EXP2 and SOIL_EXP3 for the soil exposure, SOIL_TYPE2 and SOIL_TYPE3 for the soil type, and

GRD_SR_CD2 and GRD_SR_CD3 for the ground surface condition.

Key to the fields in the dBase file VGSOSUM2

1. SITE_NO - site number, see previous descriptions.

2. VISIT_YEAR - year of visit being documented. This data base file should be used to document second and subsequent visits.

3. VISIT_NO - visit number. How many times the site has been visited.

Fields 4 - 10 apply to the first vegetation community and the second or subsequent visit. Comparison for all data should be made between visit 1 and 2, 2 and 3, 3 and 4, etc. Separate data files should be used for each comparison.

4. RV2_CM_CV1 - any revisions in the first vegetation community type. Although there should actually be no change in the vegetation communities, there were enough questions about some of the designations made in the first visits that this field represents error corrections. If no changes were made, then NC is entered.

5. RV2_VG_ST1 - encoded revisions in the vegetation structure. As in the previous field, the information in this field represents corrections. Enter NC for no changes.

6. RV2_VG_DM1 - encoded status of the vegetation damage. Enter NC for no changes.

7. RV2_SO_EX1 - encoded status of soil exposure. Enter NC for no changes.

8. RV2_SO_TY1 - any revisions in the encoded soil type. Enter NC for no changes.

9. RV2_SO_MO1 - any revision in the soil moisture. Enter NC for no changes.

10. RV2_G_S_C1 - any change in the status of the ground surface condition. Enter NC for no changes.

Fields 11 - 24 are similar to the preceding 7 fields, but the ending "2" or "3" indicates that it is for the second or third vegetation community, if present.

View Files

The information in all three files can be viewed or manipulated as if it were all in one file. This can be done by creating "view files"in which fields from the different files can be selected. For details on view files see the dBase III Plus manual (Learning dBase III Plus, chapter 7, pp. L7-1 -L7-10).

Number of data records: 102 APPENDIX 2 (Continued)
Date of last update : 06/19/89

Field	Field Name	Type	Width	Dec
1	GEN_LOC	Character	45	
2	LOCATION	Character	50	
3	SITE_NO	Character	4	
4	QUAD	Character	17	
5	TWP	Character	3	
6	RNGE	Character	3	
7	LAT	Character	6	
8	LONG	Character	7	
9	HISI	Logical	1	
10	TAGGED	Logical	1	
11	VISIT_1	Date	8	
12	LAST_VISIT	Character	4	
13	IMPACTS	Character	20	
14	MN_ACT_TK1	Character	10	
15	MN_ACT_ND1	Character	10	
16	PHOTOS	Character	2	

Press any key to continue...

17	MEMO	Memo	10	
18	VISIT_2	Date	8	
19	IMP_CHG1_2	Character	50 60	
20	CHANGES1_2	Memo	10	
21	MN_ACT_TK2	Character	10 50	
22	MN_ACT_ND2	Character	10 50	
23	PHOTOS2	Character	2 50	
** Total **			292	

VGSOSUM1.DBF

Number of data records: 102 APPENDIX 2 (Continued)
Date of last update : 04/05/89

Field	Field Name	Type	Width	Dec
1	SITE_NO	Character	4	
2	CM_TYP_CV1	Character	20	
3	VEG_STRCV1	Character	40	
4	VEG_DAMGE1	Character	25	
5	SOIL_EX1	Character	15	
6	SOIL_TY1	Character	5	
7	SOIL_MOIS1	Character	5	
8	GR_SR_C1	Character	20	
9	CM_TYP_CV2	Character	20	
10	VEG_STRCV2	Character	40	
11	VEG_DAMGE2	Character	25	
12	SOIL_EXP2	Character	15	
13	SOIL_TYPE2	Character	5	
14	SOIL_MOIS2	Character	5	
15	GRD_SR_CD2	Character	20	
16	CM_TYP_CV3	Character	20	

Press any key to continue...

17	VEG_STRCV3	Character	20	
18	VEG_DAMGE3	Character	40	
19	SOIL_EXP3	Character	15	
20	SOIL_TYPE3	Character	5	
21	SOIL_MOIS3	Character	5	
22	GRD_SR_CD3	Character	20	
** Total **			390	

Number of data records: 102
Date of last update : 04/05/89

Field	Field Name	Type	Width	Dec
1	SITE_NO	Character	4	
2	RV2_CM_CV1	Character	20	
3	RV2_VG_ST1	Character	40	
4	RV2_VG_DM1	Character	25	
5	RV2_SO_EX1	Character	15	
6	RV2_SO_TY1	Character	5	
7	RV2_SO_MO1	Character	5	
8	RV2_G_S_C1	Character	20	
9	RV2_CM_CV2	Character	20	
10	RV2_VG_ST2	Character	40	
11	RV2_VG_DM	Character	25	
12	RV2_SO_EX2	Character	15	
13	RV2_SO_TY2	Character	5	
14	RV2_SO_MO2	Character	5	
15	RV2_G_S_C2	Character	20	
** Total **			265	

< VISIT_NO Character 4

APPENDIX 3

HUMAN IMPACT SITE INVENTORY
YEAR OF LAST VISIT

HIS LOCATION	HIS NO.	LAST VISIT YEAR	NO. OF VISITS
** ALATNA RIVER			
ALATNA RIVER	126	1988	1
ALATNA RIVER	27	1986	2
ALATNA RIVER	26	1992	3
ALATNA RIVER	104	1987	1
ALATNA RIVER	30	1991	2
ALATNA RIVER	127	1988	1
ALATNA RIVER	208	1994	1
ALATNA RIVER	29	1991	2
ALATNA RIVER	46	1991	2
ALATNA RIVER	105	1987	1
ALATNA RIVER	13	1992	3
** ARRIGETCH CREEK			
ARRIGETCH CREEK	77	1986	3
ARRIGETCH CREEK	130	1991	3
ARRIGETCH CREEK	110	1991	2
ARRIGETCH CREEK	14	1992	3
ARRIGETCH CREEK	67	1986	1
ARRIGETCH CREEK	78	1988	1
ARRIGETCH CREEK	79	1992	2
ARRIGETCH CREEK	107	1991	2
ARRIGETCH CREEK	109	1992	3
ARRIGETCH CREEK	146	1991	2
ARRIGETCH CREEK	149	1992	3
ARRIGETCH CREEK	116	1992	3
ARRIGETCH CREEK	75	1991	2
ARRIGETCH CREEK	201	1992	1
ARRIGETCH CREEK	129	1987	1
ARRIGETCH CREEK	202	1992	1
** HAUL ROAD			
HAUL ROAD	101	1987	1
HAUL ROAD	117	1988	2
HAUL ROAD	139	1988	1
** JOHN RIVER			
JOHN RIVER	4	1992	3
JOHN RIVER	9	1988	1
JOHN RIVER	5	1988	1
JOHN RIVER	7	1988	1
** KILLIK RIVER			
KILLIK RIVER	65	1986	1

APPENDIX 3 (CONTINUED)

HUMAN IMPACT SITE INVENTORY
YEAR OF LAST VISIT

HIS LOCATION	HIS NO.	LAST VISIT YEAR	NO. OF VISITS
KILLIK RIVER	66	1986	1
KILLIK RIVER	6	1986	1
KILLIK RIVER	207	1992	1
** KOBUK RIVER			
KOBUK RIVER	138	1988	1
KOBUK RIVER	84	1991	2
KOBUK RIVER	206	1992	1
KOBUK RIVER	20	1991	1
KOBUK RIVER	80	1988	1
KOBUK RIVER	81	1988	1
KOBUK RIVER	18	1991	1
KOBUK RIVER	19	1993	2
KOBUK RIVER	28	1991	1
** KURUPA LAKE			
KURUPA LAKE	16	1987	1
** NE PRESERVE			
NE PRESERVE	155	1993	2
NE PRESERVE	3	1993	3
NE PRESERVE	114	1987	1
** NOATAK RIVER			
NOATAK RIVER	40	1993	3
NOATAK RIVER	49	1992	4
NOATAK RIVER	50	1991	3
NOATAK RIVER	96	1991	1
NOATAK RIVER	52	1992	4
NOATAK RIVER	53	1991	3
NOATAK RIVER	60	1991	3
NOATAK RIVER	115	1991	2
NOATAK RIVER	134	1991	2
NOATAK RIVER	51	1993	4
NOATAK RIVER	200	1992	4
NOATAK RIVER	199	1988	1
NOATAK RIVER	103	1992	3
NOATAK RIVER	97	1991	1
NOATAK RIVER	154	1992	2
NOATAK RIVER	164	1992	3
NOATAK RIVER	165	1991	2
NOATAK RIVER	98	1991	1

APPENDIX 3 (CONTINUED)

HUMAN IMPACT SITE INVENTORY
YEAR OF LAST VISIT

HIS LOCATION	HIS NO.	LAST VISIT YEAR	NO. OF VISITS
** NORTH FORK KOYUKUK			
NORTH FORK KOYUKUK	1	1986	1
NORTH FORK KOYUKUK	152	1991	1
NORTH FORK KOYUKUK	22	1986	3
NORTH FORK KOYUKUK	23	1986	3
NORTH FORK KOYUKUK	24	1986	1
NORTH FORK KOYUKUK	21	1988	3
NORTH FORK KOYUKUK	31	1988	3
NORTH FORK KOYUKUK	2	1986	2
NORTH FORK KOYUKUK	25	1986	2
NORTH FORK KOYUKUK	111	1987	1
NORTH FORK KOYUKUK	112	1987	2
NORTH FORK KOYUKUK	113	1987	2
NORTH FORK KOYUKUK	144	1988	2
NORTH FORK KOYUKUK	145	1988	2
NORTH FORK KOYUKUK	148	1988	2
NORTH FORK KOYUKUK	10	1988	1
NORTH FORK KOYUKUK	62	1991	1
NORTH FORK KOYUKUK	68	1988	3
NORTH FORK KOYUKUK	153	1991	2
NORTH FORK KOYUKUK	12	1987	1
NORTH FORK KOYUKUK	118	1987	1
NORTH FORK KOYUKUK	32	1986	1
NORTH FORK KOYUKUK	69	1988	3
NORTH FORK KOYUKUK	205	1993	1
NORTH FORK KOYUKUK	147	1988	2
** WALKER LAKE			
WALKER LAKE	55	1986	1
WALKER LAKE	33	1993	4
WALKER LAKE	56	1988	2
WALKER LAKE	35	1993	4
WALKER LAKE	57	1988	2
WALKER LAKE	41	1993	3
WALKER LAKE	58	1988	2
WALKER LAKE	43	1993	4
WALKER LAKE	59	1993	3
WALKER LAKE	45	1993	4
WALKER LAKE	61	1988	3
WALKER LAKE	48	1986	2
WALKER LAKE	64	1986	3
WALKER LAKE	54	1986	1
WALKER LAKE	106	1988	1
WALKER LAKE	36	1988	2

APPENDIX 3 (CONTINUED)

HUMAN IMPACT SITE INVENTORY
YEAR OF LAST VISIT

HIS LOCATION	HIS NO.	LAST VISIT YEAR	NO. OF VISITS
WALKER LAKE	124	1988	1
WALKER LAKE	44	1988	2
WALKER LAKE	123	1988	3
WALKER LAKE	34	1993	4
WALKER LAKE	42	1993	3
WALKER LAKE	47	1993	4
WALKER LAKE	125	1988	2
WALKER LAKE	122	1993	3
WALKER LAKE	11	1988	2
WALKER LAKE	17	1988	1
WALKER LAKE	8	1993	4

APPENDIX 4

HUMAN IMPACT SITE INVENTORY - GAAR

Visit No. _____ Site No. _____

General Location: _____ (i.e. Drainage,Lake)

Site Name: _____

Quad: _____ (1:63,360) Twnshp: _____ Range: _____ Sec.: _____

Latitude: _____ Longitude: _____

Observer(s): _____

Types of Impact: _____ (1=Fire Signs, 2=Vegetation Damage, 3=Trails, 4=Erosion, 5=Garbage, 6=Human Waste, 7=Cabins, 8=Equipment Caches, 9=Other (Specify).

Number of Tent Pad Sites: _____

Size of each Tent Pad Site: _____
(Estimate dimensions in feet, i.e. 10′ x 10′)

Number of Trails: _____

Number of Fire Rings: _____

Number of Impact Sites Visible: _____
(Number of Impact Sites visible from site being inventoried)

Size of Impacted Site (Estimate dimensions in feet): _____
(i.e. 20′ X 25′)

Number of Photos Taken: _____

Management Action Taken: _____ (1=No Action, 2=Destroyed Fire Signs, 3=Cleaned Up, 4=Dismantled Improvements, 5=Other (Specify)

Management Action Needed: _____ (1=No Action, 2=Destroy Fire Signs, 3=Clean Up-Minor, 4=Clean Up-Major, 5=Dismantle Improvements, 6=Revisit Site, 7=Advise to Camp Elsewhere, 8=No Fires Here (Not enough wood to sustain fires), 9=Other (Specify).

Comments:

(New sites require sketch on back of form. Sketches should be to scale)